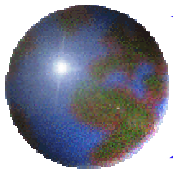# An Analysis of Infant Mortality in the District of Columbia Using Geographic Information Systems (GIS) as a Data Integration Tool

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Abstract:

Geographic Information Systems (GIS) is presented as a data integration tool to explore the infant mortality problem in the District of Columbia. The infant mortality rate (IMR) in the District of Columbia in 2000 was 11.9 deaths per 1,000 live births, which was the lowest ever recorded but still 42 percent higher than the national rate of 6.9 deaths per 1,000 live births in 2000. Preliminary spatial analysis of the District's IMR indicates a possible association with socioeconomic variables. Additionally, socioeconomic factors are found to vary according to geographic divisions. These factors indicate that GIS analyses could provide a rationale for policies design to reduce infant mortality. The results indicate that areas of high infant mortality rate are positively associated with areas of low socioeconomic status. The results also suggest that macro-level analysis in infant mortality studies can enhance their explanatory powers.
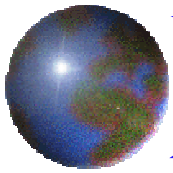
GIS Data Integration Issues

➢ Current, reliable and real time information is becoming more critical for efficient management of human and natural resources;

➢ Development of a comprehensive and central information base could decrease uncertainty and enhance decision making;

➢ Data barriers still exist due to institutional and technical issues;

➢ Categories of data are originally collected for different purposes, using different scales and for different underlying assumptions.
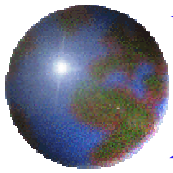
GIS – Data Integration Approaches

➢ **Full Integration** - the data sets have common fields that can be linked and thereby result in a single display of spatial data with attributes from multiple data sets.

➢ **Loose Integration** - the data sets are not physically linked but their separate features can be overlaid in a spatial display on one map.

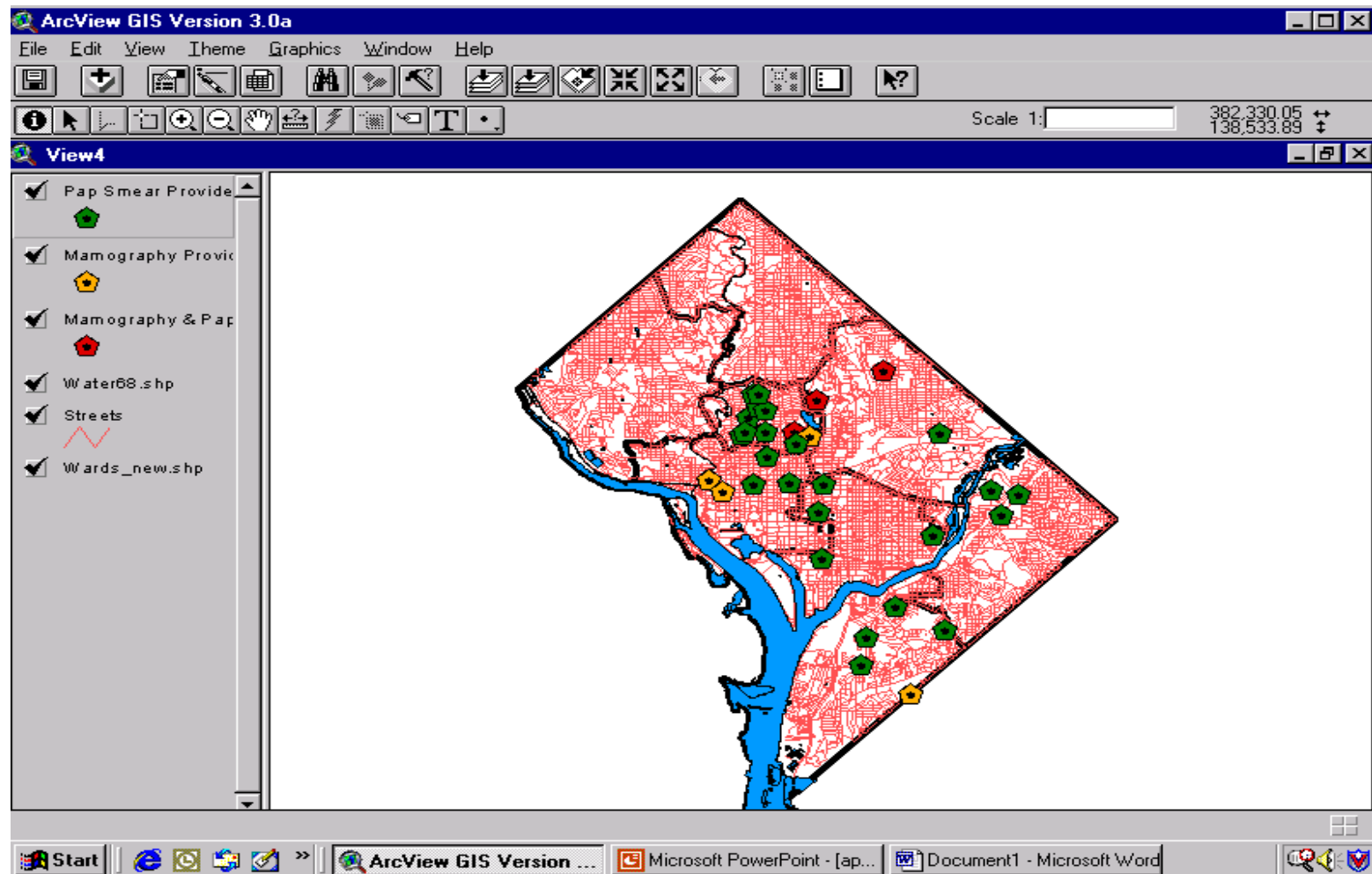➢ **Partial Integration** - the spatial data relating to each data set is displayed on its own map but can be compared visually.
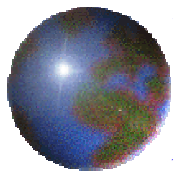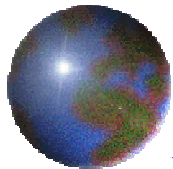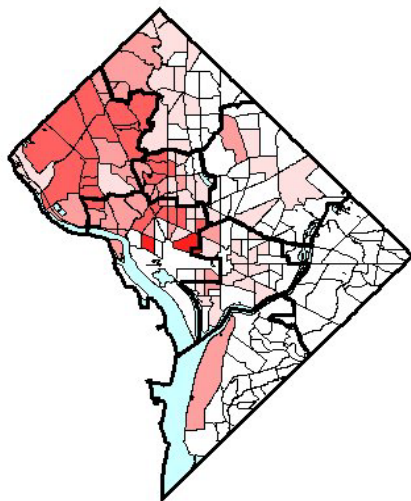
Full Integration
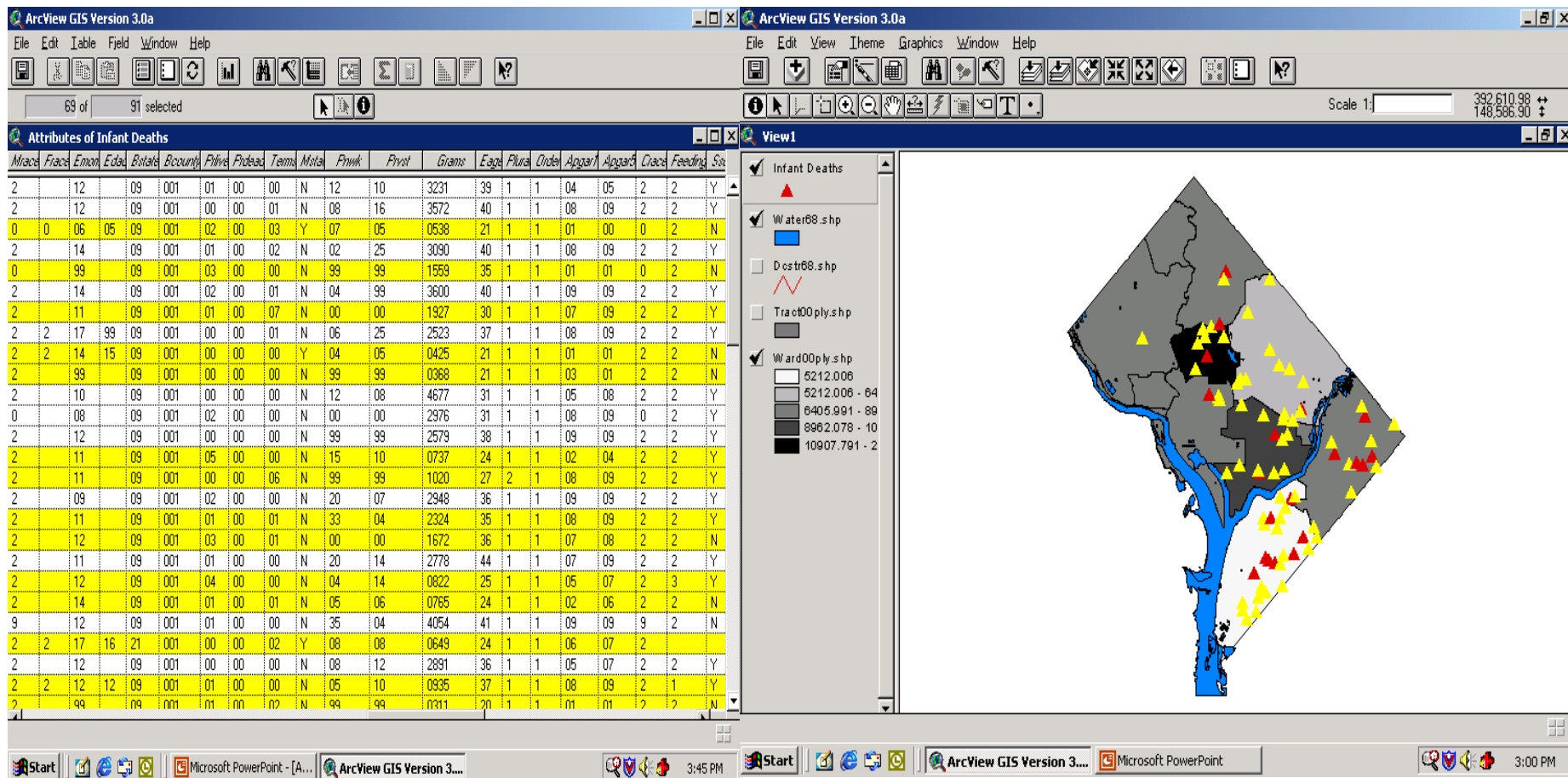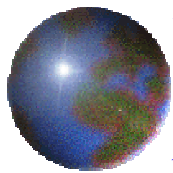
Loose Integration

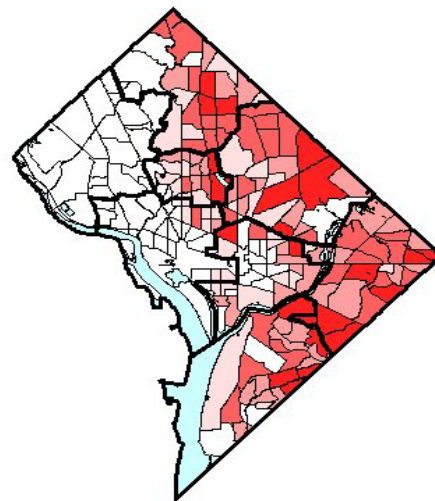# Partial Integration
Population by Census Tract, 2000

Asian

Black

White

Map maintained by DC GIS.

0 15000ft
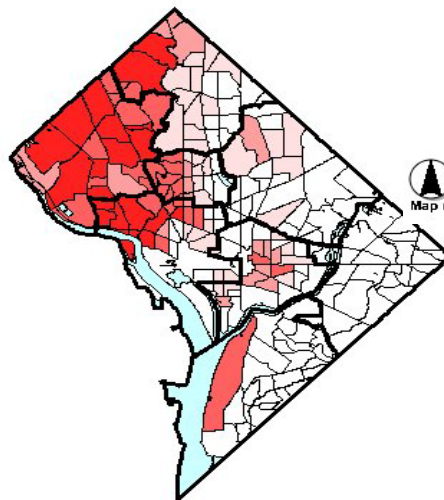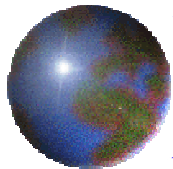
Map maintained by DC GIS.

0 15000ft

Map maintained by DC GIS.

0 15000ft

Table 1: Infant Mortality Rate District of Columbia, 1980-2000

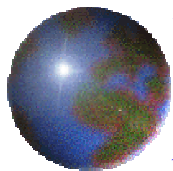| Year	Infant Mortality *Rate
1980 -1989	21.1
1990 - 1999	16.5
1995	16.1
1996	14.4
1997	13.1
1998	12.5
1999	15.0
2000	**11.9**

*Rates are per 1,000 live births.
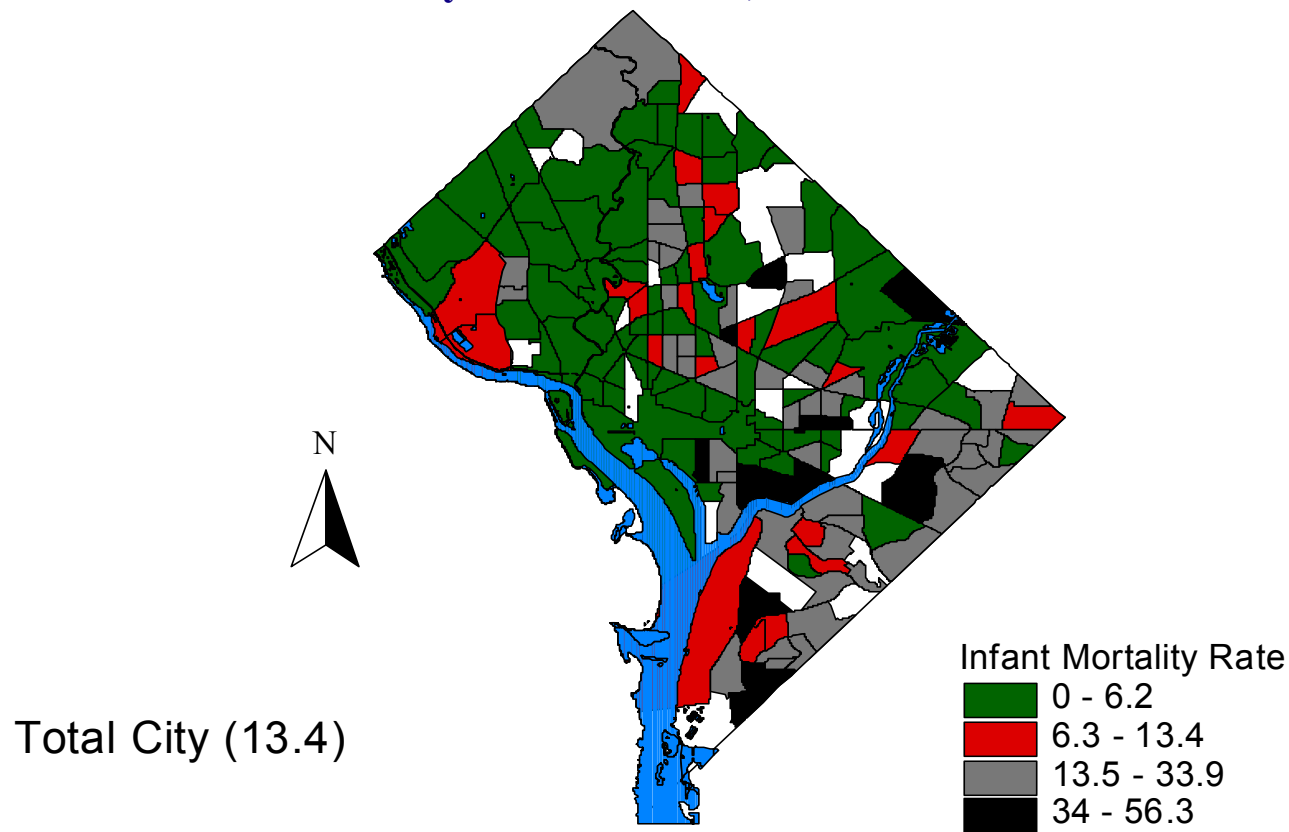Source: State Center for Health Statistics Administration, Department of Health.

Socioeconomic Indicators

➢ Median Household Income

➢ Percent High School Graduates

➢ Percent Overcrowdedness

➢ Percent Below Poverty Level

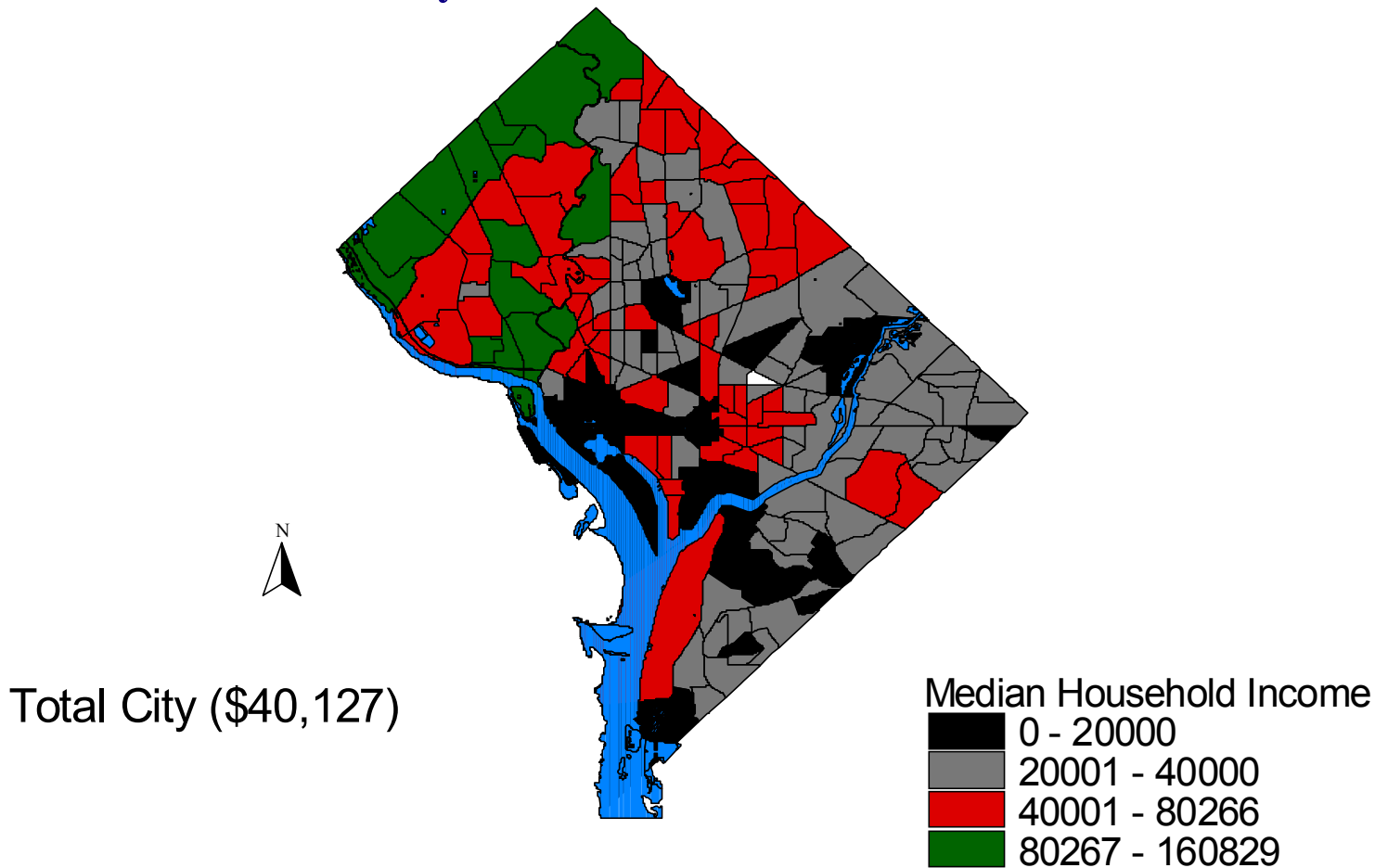➢ Percent Youth Population in Single Parent Households

District of Columbia
Infant Mortality Rate
by Census Tract, 1999-2000

N

Total City (13.4)

Infant Mortality Rate

- 0 - 6.2
- 6.3 - 13.4
- 13.5 - 33.9
- 34 - 56.3

Source: State Center for Health Statistics Administration, Department of Health
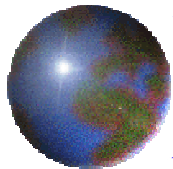
District of Columbia
Median Household Income
by Census Tract - 2000

Total City ($40,127)

N

Median Household Income
- 0 - 20000
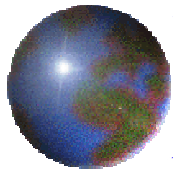- 20001 - 40000
- 40001 - 80266
- 80267 - 160829

Source: State Center for Health Statistics Administration, Department of Health
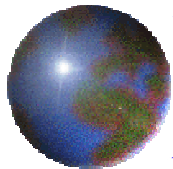
District of Columbia
Percent of Persons 25 Years and Over
Who are High School Graduates
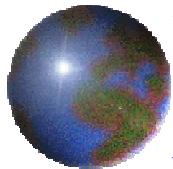# by Census Tract - 2000
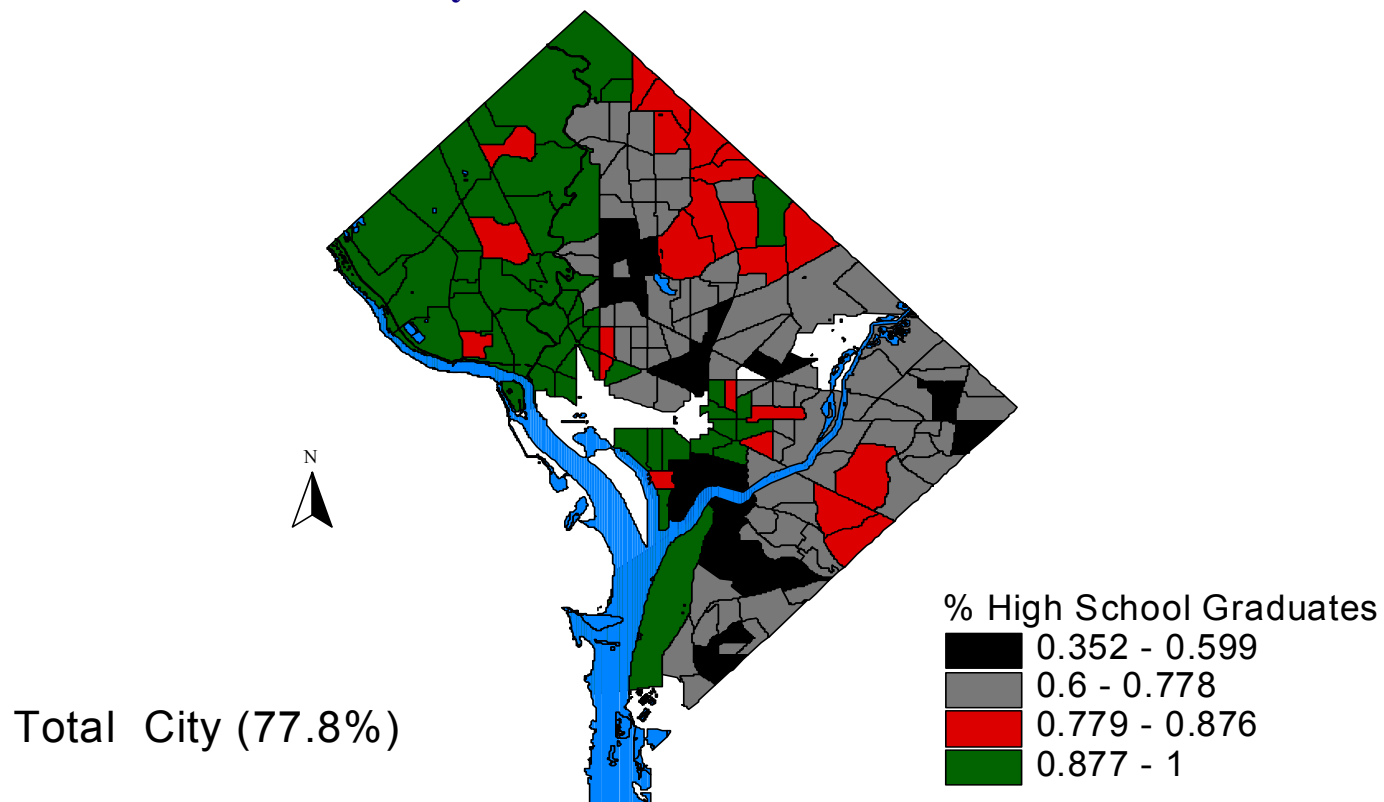
N

% High School Graduates
- ■ 0.352 - 0.599
- ■ 0.6 - 0.778
- ■ 0.779 - 0.876
- ■ 0.877 - 1

Total City (77.8%)

District of Columbia
Percent of Occupied Housing Units Overcrowded
by Census Tract - 2000
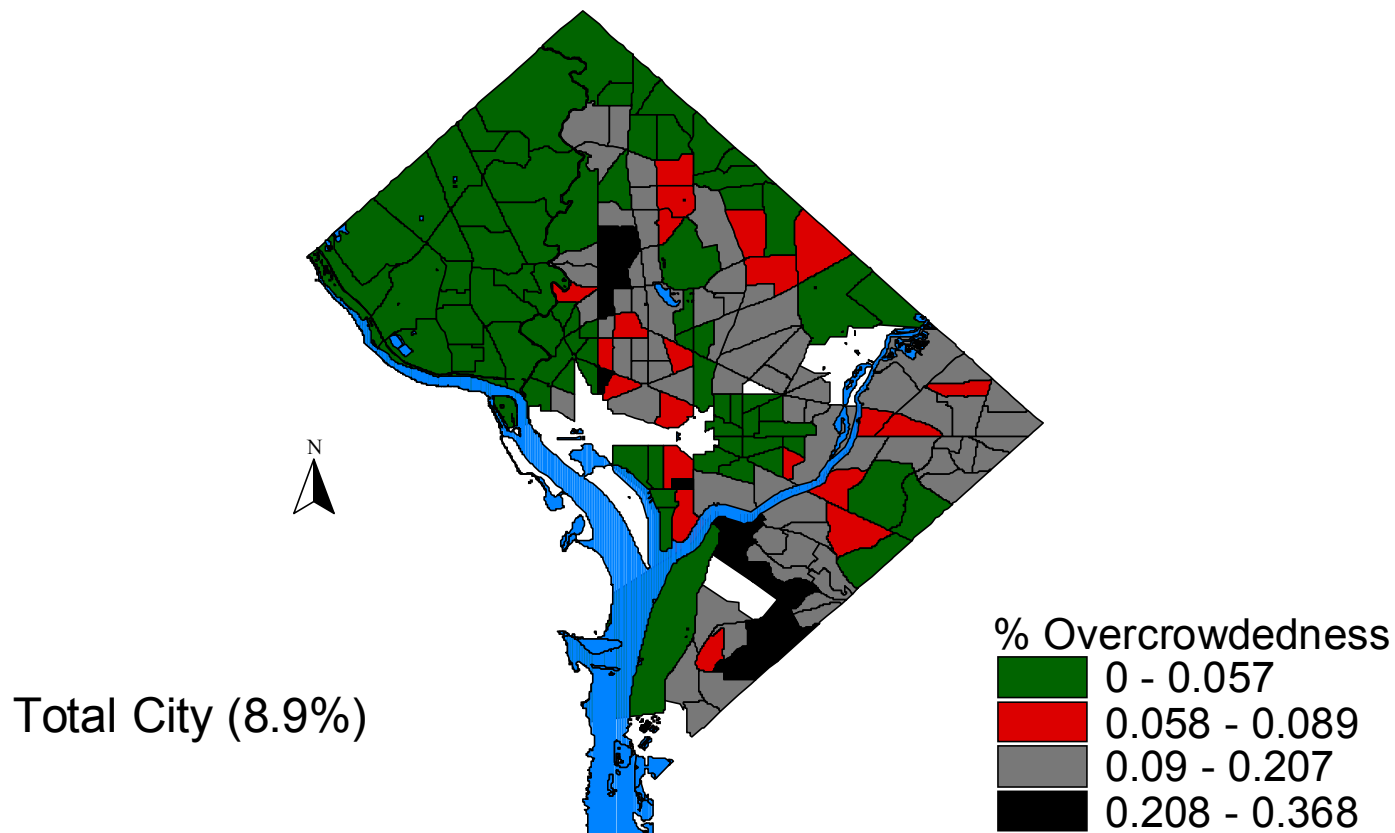
Total City (8.9%)

% Overcrowdedness
- 0 - 0.057
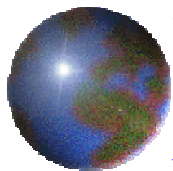- 0.058 - 0.089
- 0.09 - 0.207
- 0.208 - 0.368

Source: State Center for Health Statistics Administration, Department of Health

District of Columbia
Percent of Population Below Poverty Level
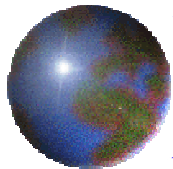by Census Tract - 1999
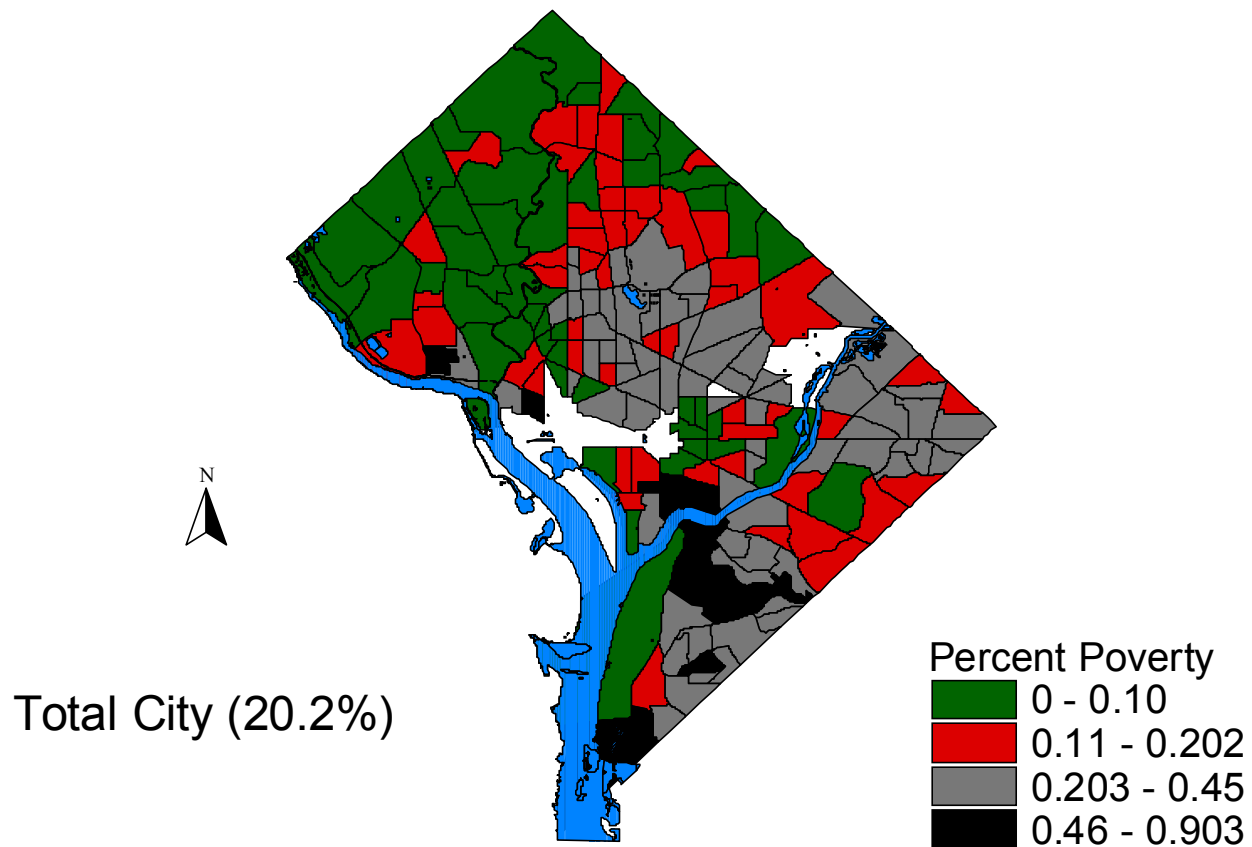
Total City (20.2%)

Percent Poverty
0 - 0.10
0.11 - 0.202
0.203 - 0.45
0.46 - 0.903

Source: State Center for Health Statistics Administration, Department of Health

District of Columbia
Percent of Single Family Households
by Census Tract - 2000

Total City (23%)

% Single Family Households
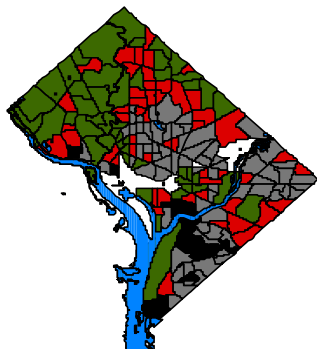- 0 - 0.12
- 0.13 - 0.23
- 0.24 - 0.5
- 0.51 - 1
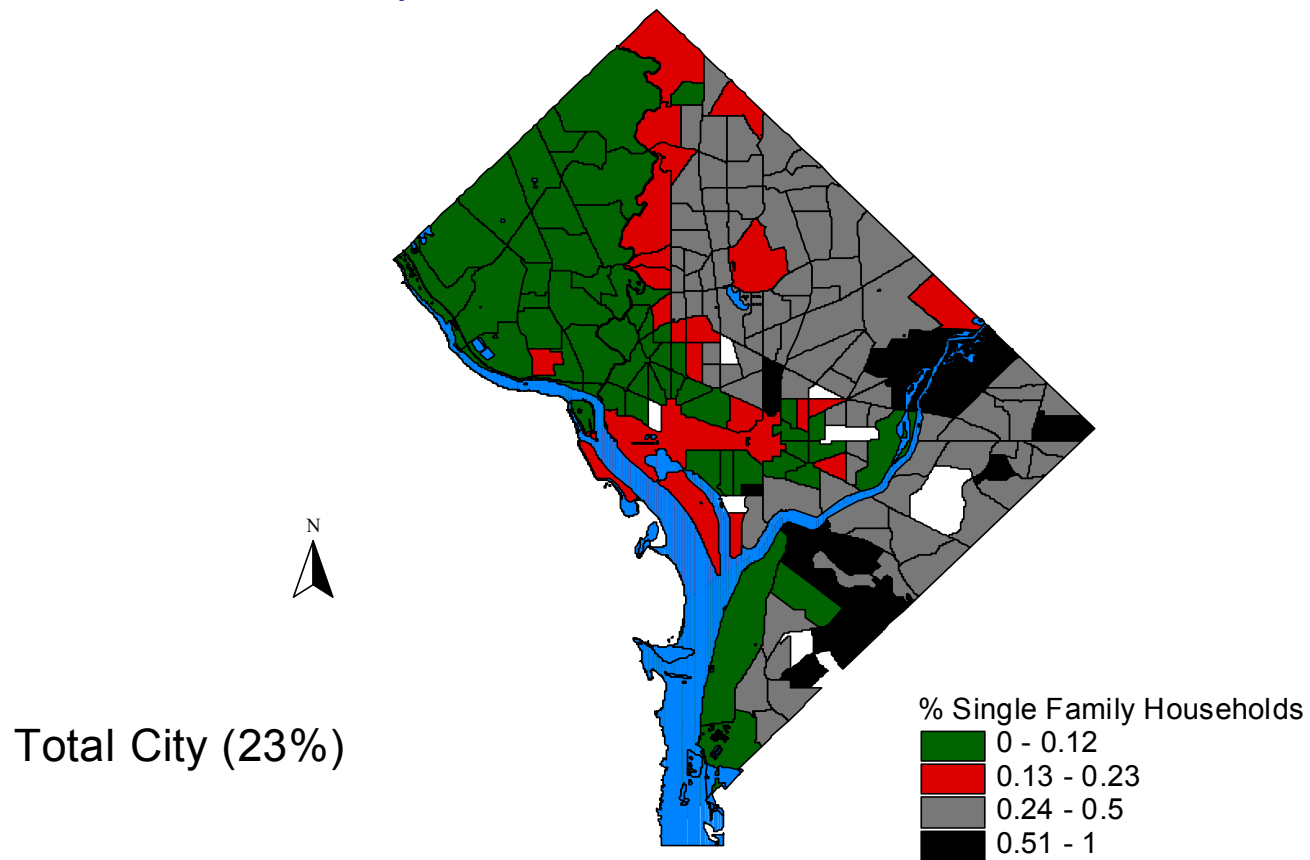
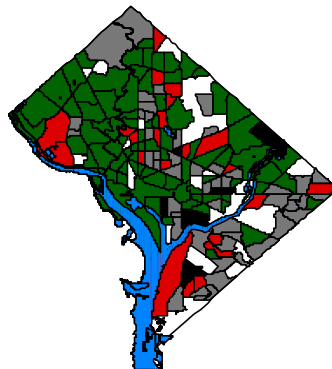Source: State Center for Health Statistics Administration, Department of Health
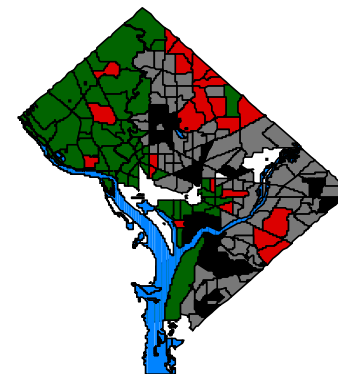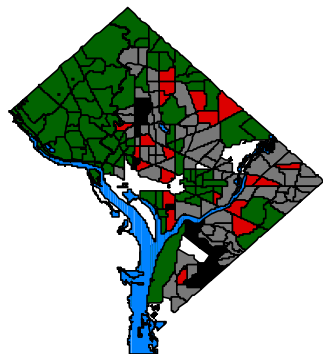
Selected Indicators

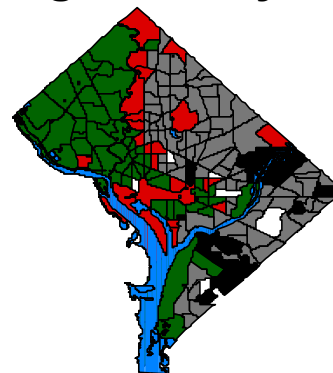**% Below Poverty**

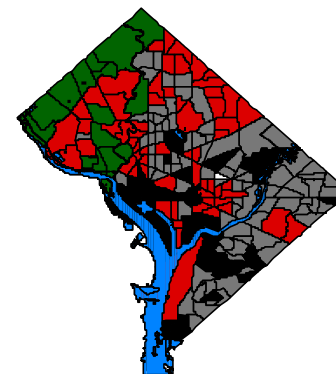**Infant Mortality Rate**
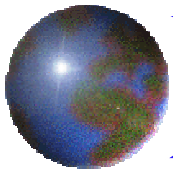
% High School Graduates

% Overcrowdedness

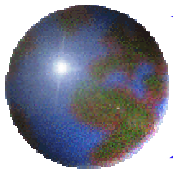**% Single Family H/H**

Median H/H Income

Recommendations - More targeted …

- ➢ Programs that enable a community to escape the cycle of poverty;
- ➢ Programs that strengthen and reward the institution of marriage;
- ➢ Programs that provide some level of job security for residents;
- ➢ Programs that ensure adequate day care arrangements and proper nutrition for infants;
- ➢ Programs that provide quality health insurance for the needy; and
- ➢ Programs that encourage and reward educational achievements.

Conclusion

This study highlights a need for the inclusion of macro-level socioeconomic variables in strategic planning for infant mortality reduction. It also demonstrates that GIS is a powerful tool for data integration, especially in the area of public health.